PATENT **040213/QUALP841US**

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Date: December 16, 2008 /Luke Clossman/
Luke Clossman

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of:			
Appellant(s):	Ranganathan Krishnan, *et al.*	Examiner:	Mounir Moutaouakil
Serial No:	10/810,457	Art Unit:	2419
Filing Date:	March 26, 2004	Conf. No:	9317

Title: SYNCHRONOUS INTER-PICONET ROUTING

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

REPLY BRIEF

Dear Sir:

Appellants submit this brief in response to an Examiner's Answer dated October 31, 2008. It is believed that no payment is due. However, in the event that any fees may be due, the Commissioner is authorized to charge such fees to Deposit Account No. 50-1063 [QUALP841US].

I. Status of Claims (37 C.F.R. §41.37(c)(1)(iii))

Claims 1-27 stand rejected by the Examiner. The rejection of claims 1-27 is being appealed.

II. Grounds of Rejection to be Reviewed (37 C.F.R. §41.37(c)(1)(vi))

A. Whether claims 1, 2, 4-6, 8, 11-16, 18-20, and 25-27 are unpatentable under 35 U.S.C. §103(a) over Gandolfo (US 7,184,767) in view of Cruz et al (US 2006/0046658).

B. Whether claims 3 and 17 are unpatentable under 35 U.S.C. §103(a) over Gandolfo in view of Cruz and further in view of Agrawal et al (US 6,072,990).

C. Whether claims 7 and 21 are unpatentable under 35 U.S.C. §103(a) over Gandolfo in view of Cruz and further in view of Palin et al (US 2003/0083015).

D. Whether claims 9 and 23 are unpatentable under 35 U.S.C. §103(a) over Gandolfo in view of Cruz and further in view of Umeda et al (US 5,920,817).

E. Whether claims 10 and 24 are unpatentable under 35 U.S.C. §103(a) over Gandolfo in view of Sun et al (Interference-aware MAC scheduling and SAR policies for Bluetooth scatternets).

VII. Argument (37 C.F.R. §41.37(c)(1)(vii))

A. Rejection of Claims 1, 2, 4-6, 8, 11-16, 18-20, and 25-27 Under 35 U.S.C. §103(a)

Claims 1, 2, 4-6, 8, 11-16, 18-20, and 25-27 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Gandolfo (US 7,184,767) in view of Cruz et al (US 2006/0046658). It was alleged that Gandolfo teaches a method of scheduling communications, comprising scheduling an inter-piconet transmission between first transmitting and receiving terminals (Figure 6c, the communication between A-2 and B-2) and scheduling an intra-piconet transmission between second transmitting and receiving terminals (Figure 3, devices 321 and 325 in communication with each other). It was admitted that Gandolfo fails to teach scheduling a power level for the inter-piconet and intra-piconet transmission that will satisfy quality parameters of the receiving terminals and that Gandolfo does not teach that the intra-piconet transmission is scheduled simultaneously with the inter-piconet transmission. It was further alleged that Cruz teaches these features in paragraphs 0017 and 0099, and that it would have been obvious for one skilled in the art to combine the two references to arrive at Appellants' claimed subject matter.

1. Response to Examiner's Answer, section 10(A)

In the Examiner's Answer, section 10(A), it was alleged that Gandolfo teaches "***scheduling an intra-piconet transmission between first transmitting and receiving terminals***", as recited in Appellants' claimed subject matter, in Gandolfo, Figure 3 and column 3, lines 37-47. Appellants agree with the Examiner's Answer that this section of Gandolfo teaches a piconet controller using a beacon to assign and define time slots for network devices listening to the beacon. However, Appellants disagree that "The controller coordinates the transmitting and receiving of the devices. Consequently, each device would know when to transmit and when to receive. Thus, scheduling of intra-piconet transmission between first and second terminals is met by Gandolfo" (*Examiner's Answer, Section 10(A), page 11*). Appellants argue that assigning transmit and receive time slots to listening devices is not the same thing as scheduling a transmission. The listening devices of Gandolfo are assigned a time slot in which to transmit and a time slot in which to receive. However, the listening devices are free to transmit whenever

they like, as long as the transmission falls within its given transmission time slot. The controller does not determine when a terminal should transmit information.

It was further alleged in the Examiner's Answer, section 10(A), that Gandolfo teaches "***scheduling an inter-piconet transmission between second transmitting and receiving terminals***" as recited in Appellants' claimed subject matter, in Figure 6C and column 11, lines 41-58. From the Examiner's Answer, Section 10(A), page 12:

> "…For instance, one of the controllers from one of the networks is capable of enabling communication between devices through time slot assignments, where each device is from a different piconet. As shown in figure 6C, devices 522a and 522b communicate with each other via a wireless link 590. Thus, the scheduling of intra [sic]-piconet [transmission] between first and second terminals is met by Gandolfo."

The first sentence, above, in the Examiner's Answer is without support from Gandolfo. Nowhere in the cited section does Gandolfo disclose a controller from one piconet assigning time slots to a terminal outside its coverage area. Gandolfo simply teaches what is referred to as "indirect overlap", wherein two non-overlapping adjacent networks rely on a mutual "controller-enabled device" to allow two controllers (i.e., controller A and controller B) to communicate with each other. (See Gandolfo, column 11, lines 21-46). There is no mention of scheduling communications whatsoever in the discussion of Figure 6c, or assigning time slots by a single controller to terminals outside its coverage area.

Regarding the remainder of the cited section from Gandolfo, Appellants are unclear as to how communications between devices 522a and 522b constitute the scheduling of a transmission between two terminals located in another piconet. Again, there is no teaching or discussion of a controller scheduling communications between terminals located in another piconet.

It was further alleged in the Examiner's Answer, section 10(A), that Cruz (US 2006/0046658) teaches scheduling power levels for the inter-piconet and intra-piconet transmissions that satisfies quality parameters of receiving terminals. From the Examiner's Answer, section 10(A), page 13:

> "However, Cruz, from the same field of endeavor, teaches a method of choosing optimal power levels in each time slot for each transmitter (see

> paragraph [0040], lines 1-2), the chosen power level has to satisfy the receiving node otherwise it will appear to the receiving node as interference (see paragraphs [0026] and [0027]."

Appellants agree that Cruz teaches choosing optimal power levels in each time slot for each transmitter in paragraph 0040, lines 1-2. However, there is no mention in paragraph 0040 that the selected power level is dependent on a *quality parameter* at a receiving terminal. Paragraph 0040 is the culmination of paragraphs 0030 through 0039, which discuss the minimum and maximum power levels for each transmitter in any given time slot in the communication system. For example, paragraph 0031 states that each "node" must conform to a peak transmission power level in each slot as defined by equation (3), while paragraph 0034 discusses the minimum transmission power in each slot defined by equation (4). Paragraph 0039 states, in essence, that a systematic approach is used to calculate a "power vector" for each transmitter that satisfies the maximum power level as defined by equation (3) and the minimum power level defined by equation (4), while minimizing the average transmitter power. Nowhere in these paragraphs is the transmitter power level discussed in terms of a "quality parameter of a receiving terminal".

Regarding paragraphs 0026 and 0027, they do not teach or suggest assigning transmitter power levels depending on a "quality parameter" of a receiving terminal. These two paragraphs simply define the assumptions of a typical wireless communication system as taught by Cruz. For instance, paragraph 0026 discusses the use of time slots, defines a generic transmission power level P, discusses path loss from transmitter to receiver, etc. Paragraph 0027 discusses the received power level at a receiver as a function of the transmitter power level, path loss, and interference as seen by the receiver. A Signal-to-Interference and Noise ration is then presented mathematically. Nowhere in these paragraphs is it taught or suggested that a transmitting power level is defined by a "quality parameter" at the receiver.

Finally, Appellant wishes to point out that assuming, *arguendo*, that Cruz teaches "scheduling power levels that satisfies quality parameters of receiving terminals", there is no teaching or suggestion in Cruz of scheduling power levels for terminals located outside a coverage area of a transmitter, i.e., scheduling power levels for an inter-piconet transmission.

Lastly, it was alleged in the Examiner's Answer, section 10(A), that both Gandolfo and Cruz each teach an "***intra-piconet transmission [that] is scheduled simultaneously with the inter-piconet transmission***".

Regarding Gandolfo, Appellants note that the Examiner has admitted that Gandolfo *fails to teach* simultaneous inter and intra transmissions. From the Examiner's Answer, page 5, second paragraph:

> "Gandolfo also does not disclose that the intra-piconet transmission is scheduled simultaneously with the inter-piconet transmission."

In addition, Appellants traverse the Examiner's allegation that:

> "Gandolfo teaches (Fig. 4b) the usage of a frame of time slots wherein each time slot enables a specific transmitter to transmit to a specific receiver. Therefore, a single frame can enable multiple transmissions concurrently." (*Examiner's Answer, Section 10(A), page 13, last paragraph*)

Appellants do not understand how the above quote from the Examiner's Answer teaches or suggests a simultaneous intra-piconet transmission with an inter-piconet transmission. Therefore, Appellants assert that a *prima facie* case of obviousness has not been established with respect to Gandolfo. Further, Appellants disagree that Gandolfo teaches the assignment of time slots that are dedicated for a specific transmission between a specific transmitter and a specific receiver. No where in Gandolfo is this taught or suggested.

With regard to Cruz, the Examiner's Answer alleges:

> "Similarly, Cruz teaches scheduling transmission employing time slots, wherein each time slot is dedicated for a specific transmission between a specific transmitter and specific receiver. Accordingly, Cruz teaches the same method of communication as previously discussed by Gandolfo." (*Examiner's Answer, page 13, last paragraph*)

Again, Appellants do not understand how the above quote from the Examiner's Answer teaches or suggests a simultaneous intra-piconet transmission with an inter-piconet transmission. Therefore, Appellants assert that a *prima facie* case of obviousness has not been established with

respect to Cruz as well. Further, Appellants disagree that Cruz teaches the assignment of time slots that are dedicated for a specific transmission between a specific transmitter and a specific receiver. No where in Cruz is this taught or suggested.

B. **Rejection of Claims 3 and 17 Under 35 U.S.C. §103(a)**

Appellants do not have any further arguments with respect to claims 3 and 17.

C. **Rejection of Claims 7 and 21 Under 35 U.S.C. §103(a)**

Appellants do not have any further arguments with respect to claims 7 and 21.

D. **Rejection of Claims 9 and 23 Under 35 U.S.C. §103(a)**

Appellants do not have any further arguments with respect to claims 9 and 23.

E. **Rejection of Claims 10 and 24 Under 35 U.S.C. §103(a)**

Appellants do not have any further arguments with respect to claims 10 and 24.

Conclusion

For at least the above reasons, the claims currently under consideration are believed to be patentable over the cited references. Accordingly, it is respectfully requested that the rejections of claims 1-27 be reversed.

If any additional fees are due in connection with this document, the Commissioner is authorized to charge those fees to Deposit Account No. 50-1063 [QUALP841US].

Respectfully submitted,
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VIII. Claims Appendix (37 C.F.R. §41.37(c)(1)(viii))

1. (Original) A method of scheduling communications, comprising:

scheduling an inter-piconet transmission between first transmitting and receiving terminals including scheduling a power level for the inter-piconet transmission that satisfies a target quality parameter at the first receiving terminal; and

scheduling an intra-piconet transmission between second transmitting and receiving terminals, including scheduling a power level for the intra-piconet transmission that satisfies a target quality parameter at the second receiving terminal, the intra-piconet transmission being scheduled simultaneous with the inter-piconet transmission.

2. (Original) The method of claim 1 further comprising transmitting the schedule for the inter-piconet transmission to the first transmitting terminal, and transmitting the schedule for the intra-piconet transmission to the second transmitting terminal.

3. (Original) The method of claim 1 wherein the quality parameter comprises a carrier-to-interference ratio.

4. (Original) The method of claim 1 wherein the first transmitting terminal and the second transmitting and receiving terminals are members of a first piconet, and the first receiving terminal is a member of a second piconet.

5. (Original) The method of claim 1 wherein the first transmitting terminal and the second transmitting and receiving terminals are members of a first piconet, and the first receiving terminal is a member of the first piconet and a second piconet.

6. (Original) The method of claim 5 wherein the inter-piconet transmission comprises information, the information being destined for a third terminal, the third terminal being a member of the second piconet, but not a member of the first piconet, the method further comprising scheduling a transmission of the information from the first receiving terminal to the third terminal.

7. (Original) The method of claim 1 further comprising receiving information relating to path loss between the first transmitting and receiving terminals, the scheduled power level for the inter-piconet transmission being a function of the information.

8. (Original) The method of claim 1 wherein the first transmitting terminal and the second transmitting and receiving terminals are members of a first piconet, and the first receiving terminal is a member of a second piconet, the method further comprising transmitting the inter-piconet transmission schedule to a third terminal in the second piconet, the third terminal being responsible for scheduling intra-piconet transmissions in the second piconet.

9. (Original) The method of claim 1 further comprising assigning a first spreading code to the inter-piconet transmission, and a second spreading code to the intra-piconet transmission, the first spreading code being different from the second spreading code.

10. (Original) A method of scheduling communications, comprising:

receiving in a first piconet information relating to a scheduled inter-piconet transmission from a second piconet; and

scheduling a plurality of intra-piconet transmissions in the first piconet with no intra-piconet transmissions being scheduled simultaneously with the inter-piconet transmission.

11. (Original) A method of scheduling communications, comprising:

receiving in a first piconet timing information relating to a scheduled inter-piconet transmission from a first transmitting terminal in a second piconet to a first receiving terminal in the first piconet;

scheduling an intra-piconet transmission between second transmitting and receiving terminals in the first piconet simultaneously with the inter-piconet transmission;

scheduling a power level for the inter-piconet transmission that satisfies a target quality parameter at the first receiving terminal; and

scheduling a power level for the intra-piconet transmission that satisfies a target quality parameter at the second receiving terminal.

12. (Original) The method of claim 11 further comprising transmitting the scheduled power level for the inter-piconet transmission to a third terminal in the second piconet, the third terminal being responsible for scheduling intra-piconet transmissions in the second piconet.

13. (Original) A communications terminal, comprising:

a scheduler configured to schedule an inter-piconet transmission between first transmitting and receiving terminals including scheduling a power level for the inter-piconet transmission that satisfies a target quality parameter at the first receiving terminal, the scheduler further being configured to schedule an intra-piconet transmission between second transmitting and receiving terminals including scheduling a power level for the intra-piconet transmission that satisfies a target quality parameter at the second receiving terminal, the intra-piconet transmission being scheduled simultaneous with the inter-piconet transmission.

14. (Original) The communications terminal of claim 13 further comprising a transmitter configured to transmit the schedule of the inter-piconet transmission to the first transmitting terminal, and transmit the schedule of the of intra-piconet transmission to the second transmitting terminal.

15. (Original) The communications terminal of claim 14 further comprising a transceiver having the transmitter, and a user interface configured to allow a user to engage in communications with another terminal through the transceiver.

16. (Original) The communications terminal of claim 15 wherein the user interface comprises a keypad, a display, a speaker and a microphone.

17. (Original) The communications terminal of claim 13 wherein the quality parameter comprises a carrier-to-interference ratio.

18. (Original) The communications terminal of claim 13 wherein the first transmitting terminal and the second transmitting and receiving terminals are members of a first piconet, and the first receiving terminal is a member of a second piconet.

19. (Original) The communications terminal of claim 13 wherein the first transmitting terminal and the second transmitting and receiving terminals are members of a first piconet, and the first receiving terminal is a member of the first piconet and a second piconet.

20. (Original) The communications terminal of claim 19 wherein the inter-piconet transmission comprises information, the information being destined for a third terminal, the third terminal being a member of the second piconet, but riot a member of the first piconet, the scheduler being further configured to schedule a transmission of the information from the first receiving terminal to the third terminal.

21. (Original) The communications terminal of claim 13 further comprising a receiver configured to receive information relating to path loss between the first transmitting and receiving terminals, the scheduled power level for the inter-piconet transmission being a function of the information.

22. (Original) The communications terminal of claim 13 wherein the first transmitting terminal and the second transmitting and receiving terminals are members of a first piconet, and the first receiving terminal is a member of a second piconet, the communications terminal further comprising a transmitter configured to transmit the inter-piconet transmission schedule to a third terminal in the second piconet, the third terminal being responsible for scheduling intra-piconet transmissions in the second piconet.

23. (Original) The communications terminal of claim 13 further comprising a processor configured to assign a first spreading code to the inter-piconet transmission and a second spreading code to the intra-piconet transmission, the first spreading code being different from the second spreading code.

24. (Original) A communications terminal operable in a first piconet, comprising:

a receiver configured to receive information relating to a scheduled inter-piconet transmission from a second piconet; and

a scheduler configured to schedule a plurality of intra-piconet transmissions in the first piconet with no intra-piconet transmissions being scheduled simultaneously with the inter-piconet transmission.

25. (Original) A communications terminal operable in a first piconet, comprising:

a receiver configured to receive timing information relating to a scheduled inter-piconet transmission from a first transmitting terminal in a second piconet to a first receiving terminal in the first piconet; and

a scheduler configured to schedule an intra-piconet transmission between second transmitting and receiving terminals in the first piconet simultaneously with the inter-piconet transmission, the scheduler being further configured to schedule a power level for the inter-piconet transmission that satisfies a target quality parameter at the first receiving terminal, and schedule a power level for the intra-piconet transmission that satisfies a target quality parameter at the second receiving terminal.

26. (Original) The communications terminal of claim 25 further comprising a transmitter configured to transmit the scheduled power level for the inter-piconet transmission to a third terminal in the second piconet, the third terminal being responsible for scheduling intra-piconet transmissions in the second piconet.

27. (Original) A communications terminal, comprising:

means for scheduling an inter-piconet transmission between first transmitting and receiving terminals including scheduling a power level for the inter-piconet transmission that satisfies a target quality parameter at the first receiving terminal; and

means for scheduling an intra-piconet transmission between second transmitting and receiving terminals, including scheduling a power level for the intra-piconet transmission that satisfies a target quality parameter at the second receiving terminal, the intra-piconet transmission being scheduled simultaneous with the inter-piconet transmission.

IX. Evidence Appendix (37 C.F.R. §41.37(c)(1)(ix))

None.

X. Related Proceedings Appendix (37 C.F.R. §41.37(c)(1)(x))

None.